Lecture Module - Data Acquisition

ME3023 - Measurements in Mechanical Systems

Mechanical Engineering

Tennessee Technological University
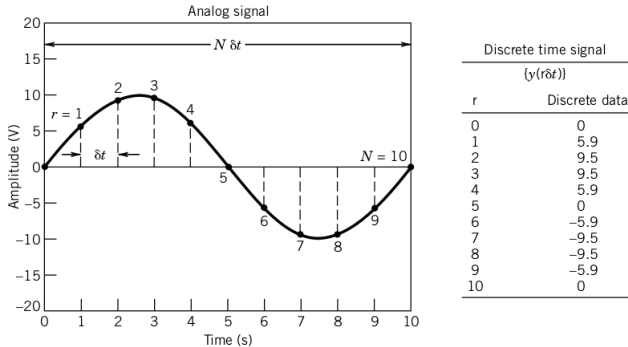
Topic 3 – Sampling and Aliasing

Topic 3 - Sampling and Aliasing

- Sampling

- The Aliasing Phenomenon

- Example by Hand

- MATLAB Example

Sampling

... A discrete time signal usually results from the sampling of a continuous variable at repeated finite time intervals. ...

Text,Figure: Theory and Design for Mechanical Measurements Ch. 7

Sampling

The Aliasing Phenomenon
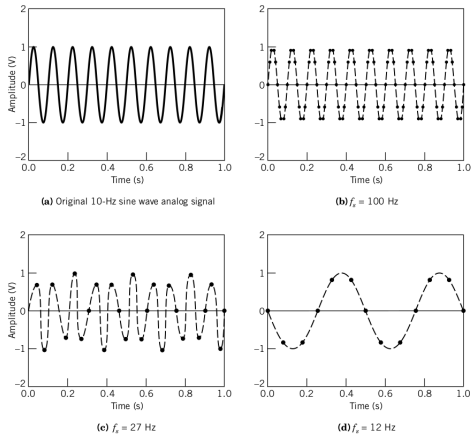

Figure: Theory and Design for Mechanical Measurements Ch. 7

Example by Hand
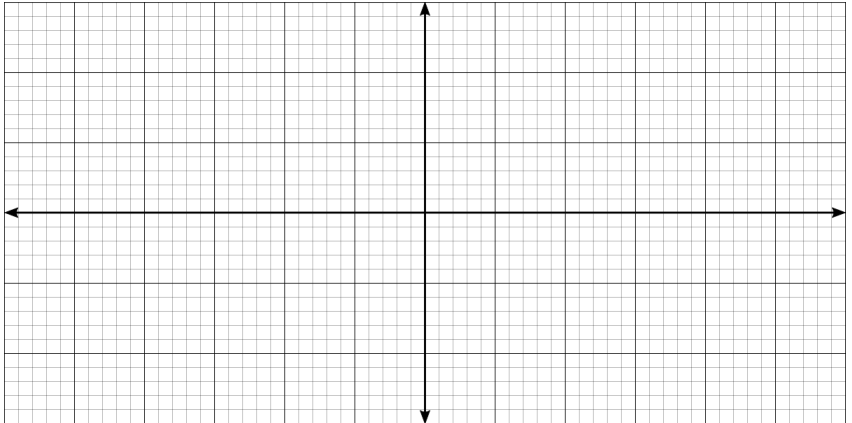

Image: T.Hill

Example by Hand

MATLAB Example

```matlab
% ME3023 - Tennessee Technological University
% Tristan Hill - October 10, 2019 - April 14, 2021
% Data Acquisition Topic 3 - Sampling and Aliasing

clear variables; close all; clc

% simulate a continuous signal
A1=5; f1=3;
w1=2*pi*f1;

dt_sim=0.001; t_stop=6;
t_sim=0:dt_sim:t_stop;
y_sim=A1*sin(w1*t_sim);
```

MATLAB Example

```matlab
% simulate sampling the signal
dt_sam = 0.3;
t_sam=0:dt_sam:t_stop;
y_sam=A1*sin(w1*t_sam);

% show the figure
figure(1); hold on
plot(t_sim,y_sim,'-',t_sam,y_sam,'o')
axis([0 t_stop -1.2*A1 1.2*A1])
grid on
```

MATLAB code: T. Hill